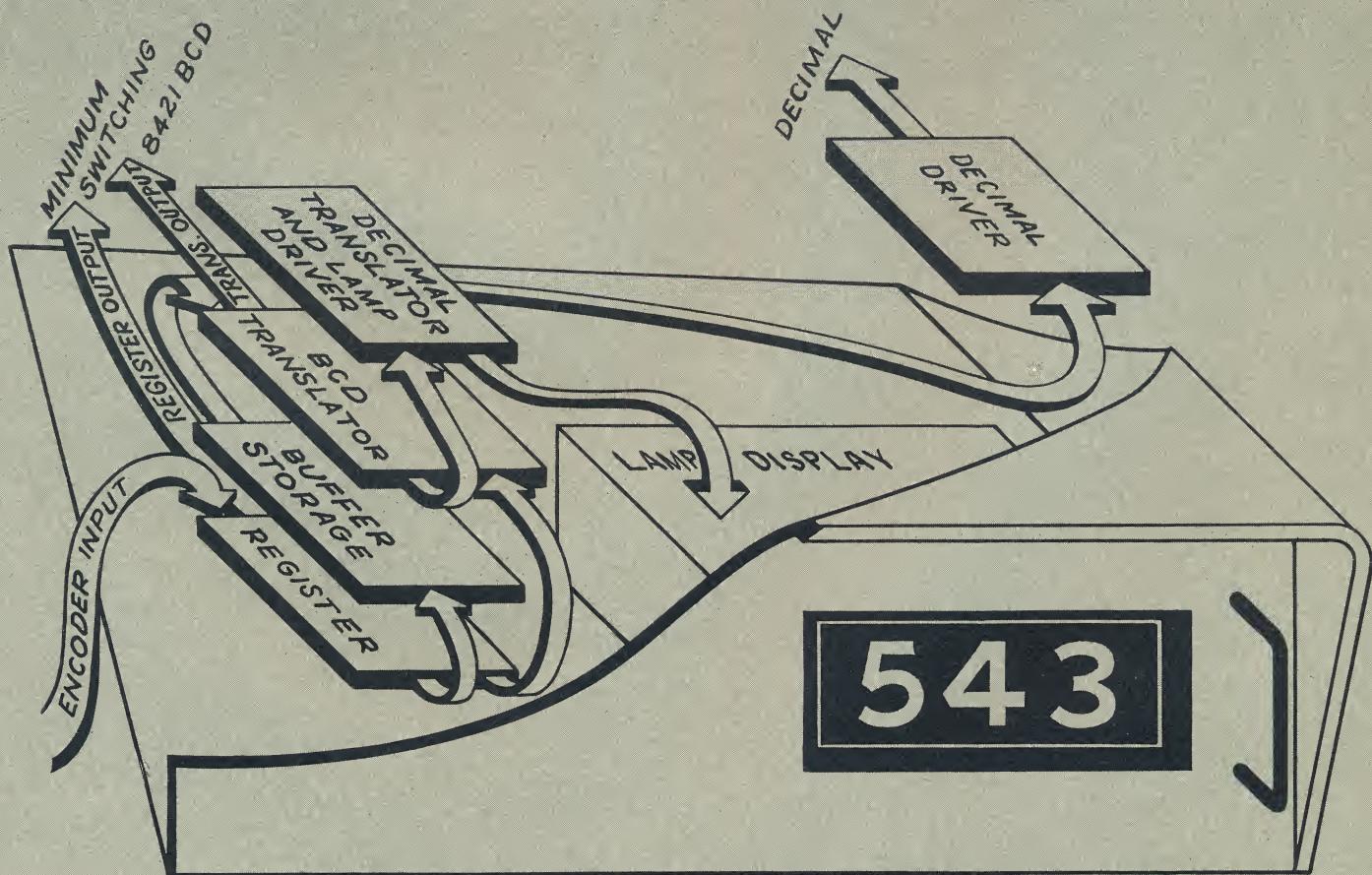


PERKIN-ELMER



## DIGITAL MONITORING AND CONTROL



## ENCODER/READOUT SYSTEMS

Perkin-Elmer supplies a complete product line of digital encoding and readout equipment. The variety of absolute position encoders and solid state readouts is indicated by the number of different readout codes and options listed in the tables of Page 4.

By the use of modularized components, Perkin-Elmer supplies system requirements of increasing complexity to the point of the terminal equipment itself in many cases. Standard Encoder/Readouts will drive printers and display lights. The addition of interface equipment permits the direct drive of card and tape punches or tape recorders. Selection of the appropriate A/D building blocks will provide an Encoder/Readout with high reliability and flexibility.



Figure 1—Block diagram of Perkin-Elmer Encoder/Readout

## APPLICATIONS

- **General**

Applications for Perkin-Elmer integrated Encoder/Readouts include:

Navigation Displays	Tracking Equipment
Numerical Control	Industrial Weighing
Radar Pedestal Stands	Spectrometers
Radio Astronomy Antennae	X-Y Plotters

- **Strip Chart Recorders**

Digitizing of strip chart recorders offers an ideal medium for the Linear Motion Encoder. The 1000-count Absolute Position Encoder Readout System has been applied to the Honeywell Electronik®, Leeds & Northrup Speedomax® and Bristol Dynamaster® recorders. The encoder mounts adjacent to the slide wire potentiometer in the recorder. Retrofit kits with installation instructions are available.

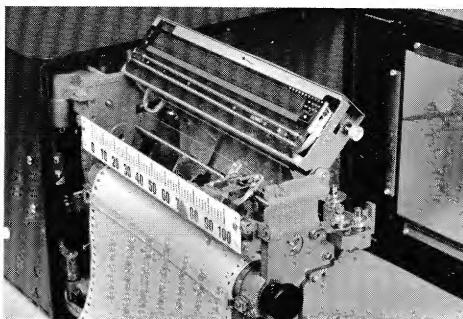


Figure 3—Perkin-Elmer Linear Motion Encoder mounted in a Honeywell Recorder

- **Navigation and Radar Pedestals**

Both 3,600 and 21,600-count Perkin-Elmer encoders are applicable for navigation and radar pedestal uses where readouts are desired in tenths of a degree or in minutes. Standard 4, 5, or 6-digit readouts are available.

The standard Perkin-Elmer Digital Encoder/Readout consists of the following stages as shown in the block diagram in Figure 1 and symbolically on the front cover: 1) encoder, 2) encoder register developing a minimum switching code output, 3) translator developing an 8421 BCD output, 4) a decimal light driver, 5) power supply and a 6) projection lamp display. This integrated Encoder/Readout, in the desk top model, is illustrated on the front cover. The Encoder/Readout contains both visual display and a connector for 8421 BCD output, and is mounted in a 19" relay rack panel. Complementary BCD output is available at the receptacle.

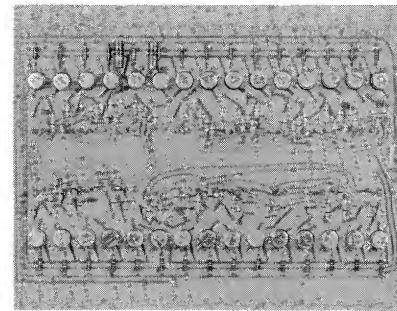


Figure 2—Translator card of Encoder/Readout illustrating all solid state construction

- **Linear Variable Differential Transformers**

Linear variable differential transformers, as primary sensing elements, can operate into two-phase non-recording null-balance systems. With Perkin-Elmer Absolute Position Encoders, this allows the direct encoding of load cell, strain-gage, and temperature sensor outputs. LVDTs make it possible to go directly from the sensing element to a remote readout without an intermediate recorder stage.

- **Numerical Control**

Perkin-Elmer Encoders are applicable to programming where the encoder is a control element. This application is illustrated schematically in Figure 4.

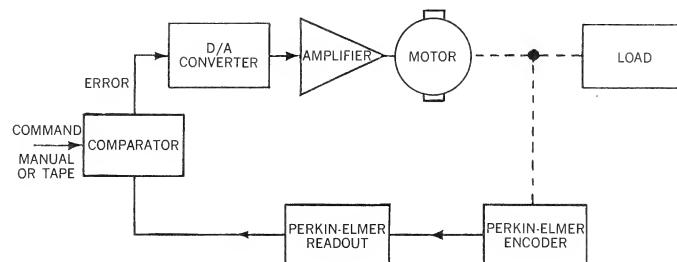


Figure 4—Perkin-Elmer Encoder/Readout as a control element in a digital servo loop

- **Leadscrew Applications**

1000-count encoders are available where leadscrews can be calibrated directly to the number of encoder turns, thus providing readout in thousandths of inches, mm, etc.

## PERKIN-ELMER ABSOLUTE POSITION ENCODERS—SUMMARY OF FEATURES

- Perkin-Elmer Encoders are self-indexing and provide absolute position data with an accuracy of  $\pm 1$  count.
- Brush noise is eliminated—the encoder output is generated by a bistable electronic register and not at a code disk as with conventional encoders.
- Low torque and long commutator life are the direct result of a single brush operating with very light pressure.
- The single brush is directly coupled to the shaft and the encoder disk remains fixed with respect to the housing. Hence, moment of inertia is greatly reduced.
- Ambiguity is eliminated by the unique one-brush technique. There are no problems of brush alignment or requirements for U-Scan or V-Scan techniques. The single brush allows the construction of the Absolute Position Linear Motion Encoder.
- Readouts can drive peripheral equipment concurrently from translator and driver stages.
- The combination of all the above features plus traditional Perkin-Elmer quality of manufacture provides you with a guarantee of **5 million shaft revolutions**.

## BUFFER STORAGE

Solid-state buffer storage is available with Perkin-Elmer Encoder/Readouts, both with and without decimal light displays. To avoid ambiguities in the stored information, a special Minimum Switching Code (See note on page 4) is stored in the register which results in a maximum error of only 1 bit. The stored information is strobed out in a parallel 8421BCD.

## OTHER OPTIONS

- Standard systems with 2421 BCD instead of 8421 are available at no price premium. These include a BCD receptacle and power supply.
- Minimum systems, designed primarily for field retrofits, include an encoder and register only. Register output code options are Gray Minimum Switching, Binary or Datex. The electronics for the minimum system is packaged in an 8" x 10" x 3" enclosure with signal and power receptacles.
- BCD output with no display.
- BCD output with BCD vertical display.
- Desk top console packaging is available to supplement the standard 19" relay rack mounting configuration.

## COMPATIBILITY OF PERKIN-ELMER ENCODER/READOUTS WITH PERIPHERAL EQUIPMENT

Perkin-Elmer Encoder/Readouts are compatible with standard printers, tape and card punches, and tape recorders. Since this peripheral equipment requires vary-

ing inputs, the compatible equipment shown in Figure 5 is related to the appropriate stage of Perkin-Elmer Encoder/Readout.

- The standard Readout has a continuous output. With buffer storage, readout may be obtained on command from an external contact closure or voltage pulse. Interrogation of buffer storage and display of the storage value is available as an option.
- A multiplexing accessory that provides up to 24-channel identification is available with the 1000-count linear motion encoder (Model 11L/1000).
- Minor component modification allows the substitution of Nixies® for projection lamp displays.
- An output stage and receptacle can be added to the standard Encoder/Readout to provide an output for a decimal printer.

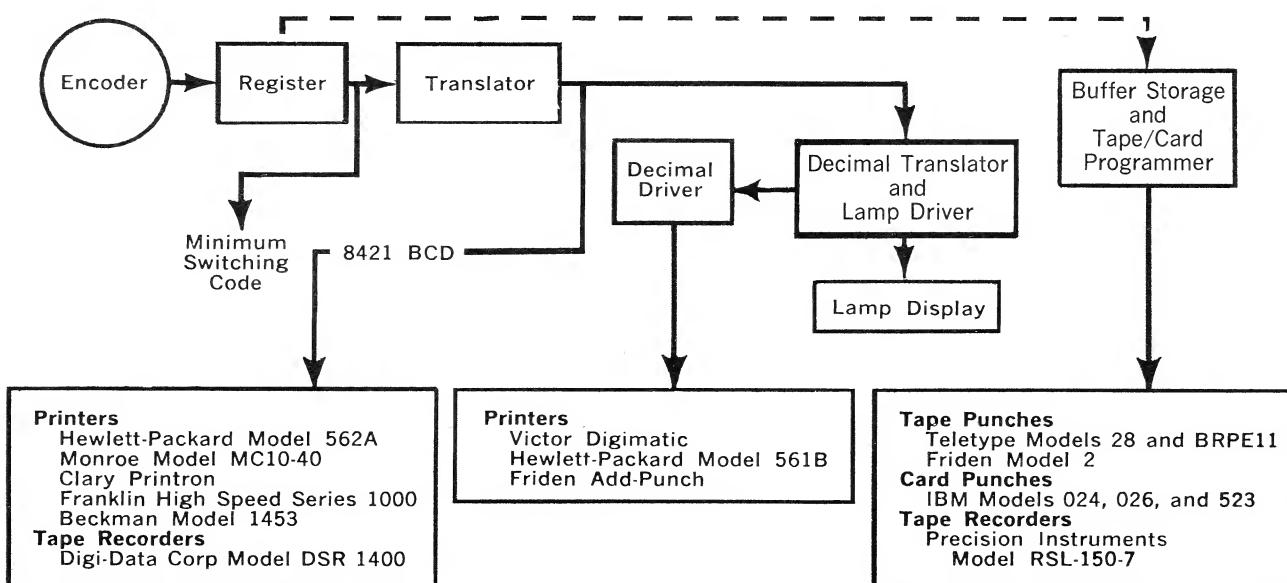


Figure 5

# PERKIN-ELMER DIGITAL ENCODER SPECIFICATIONS

Total Counts	Turns	Counts/Turn	Starting & Running Torques <sup>1</sup>	Tracking Speed (Max.) <sup>2</sup>	Weight	Size	Model Number
100	1	100	0.25 in. oz.	500 rpm	11 oz.	2.5 in.	1/100
200	1	200	0.25 in. oz.	500 rpm	11 oz.	2.5 in.	1/200
1,000	1	1000	0.25 in. oz.	120 rpm	15 oz.	4 in. <sup>3</sup>	1/1000
1,000	10	100	0.30 in. oz.	500 rpm	12 oz.	2.5 in.	10/100
1,000	Linear Motion	Linear Motion	Compatible with Brown and Bristol Recorders			Electrical Pattern—11 in.	11L/1000
1,000	Linear Motion	Linear Motion	Compatible with L&N Recorders			Electrical Pattern—6.5 in.	6L/1000
1,024	1	1024	0.25 in. oz.	120 rpm	15 oz.	4 in. <sup>3</sup>	1/1024
10,000	10	1000	0.35 in. oz.	120 rpm	22 oz.	4 in. <sup>3</sup>	10/1000
100,000	100	1000	0.40 in. oz.	120 rpm	29 oz.	4 in. <sup>3</sup>	100/1000
360	1	360	0.25 in. oz.	400 rpm	11 oz.	2.5 in.	1/360
3,600	36	100	0.30 in. oz.	500 rpm	12 oz.	2.5 in.	36/100
21,600	36	600	0.35 in. oz.	150 rpm	22 oz.	4 in. <sup>3</sup>	36/600

Accuracy	Better than $\pm 1$ Count
Dielectric Strength	100 Volts
Insulation Resistance	1K Megohms
Voltage Rating	25 Volts, dc
Contact Current Rating	10 ma, maximum resistive load
Life	Guaranteed 5 million shaft turns
Shaft Slew Speed (Max.)	1000 rpm

Notes: 1—Unsealed units. Running torque measured at 10 rpm.

2—Readout speed depends upon peripheral equipment. Values shown are maximum encoder tracking speeds.

3—Hollow shaft provided.

## PERKIN-ELMER ENCODER/READOUTS

Description/Specifications (All with Power Supply)	3 Digit Readout Model Numbers	4 Digit Readout Model Numbers	5 Digit Readout Model Numbers	6 Digit Readout Model Numbers
Decimal Light Readout (Standard)	3 RL	4 RL	5 RL	6 RL
Register, Translator, No Lights	3 R	4 R	5 R	6 R
Standard Decimal Light Readout; Decimal Printer Output	3 RLD	4 RLD	5 RLD	6 RLD
Register, Translator, Decimal Printer Output, No Lights	3 RD	4 RD	5 RD	6 RD
Decimal Light Readout and Buffer Storage	3 RLS	4 RLS	5 RLS	6 RLS
Buffer Storage, No Lights	3 RS	4 RS	5 RS	6 RS
Input Voltage	115 volts @ 50/60 cps, 1 ampere max.			
Input Signal	From encoders above			
Response Time	10 microseconds			
Receptacle Output Code (Standard)	8421 BCD			
BCD Output Level	0 or -6 volts, 2 ma. Binary 0 may be either value.			
Decimal Plug Output Level	14 volts @ 100 ma			
Range of Ambient Temperature Operation	-20° to 55°C			

## REGISTERS/TRANSLATORS FOR PERKIN-ELMER ABSOLUTE POSITIONS ENCODERS

Description	Code	Output <sup>1</sup>	Model Number
Register Only	Minimum Switching <sup>2</sup>	0 and -6 volts @ 2ma	1 R
Register Only	Gray	0 and -6 volts @ 2ma	1 RG
Register and Translator Only	8421 BCD	0 and -6 volts @ 2ma	1 R/T

Notes: 1—Other voltage levels available.

2—Special Minimum Switching Code utilized for Perkin-Elmer Encoders.

## POWER SUPPLIES FOR PERKIN-ELMER ABSOLUTE POSITION ENCODER AND ENCODER/READOUTS

Input Voltage	115 volts @ 50/60 cps, 1 ampere, maximum	
Output Voltages	For 3 Digit Readout	For 6 Digit Readout
-18 volts	@ 250 ma	@ 500 ma
-6 volts	50 ma	100 ma
+12 volts	50 ma	100 ma
+14 volts (For decimal lights)	600 ma	1.2 amperes

Brochure SE4B

October 11, 1963

The information hereon is subject to change without notice.

For additional information or other specifications contact your local representative or:

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